CLAIMS

What is claimed is:

1. A method of forming a coating supported by an implantable device, comprising the acts of:

applying a first composition containing particles to an implantable device to form a coating containing the particles, wherein the coating containing the particles acts as a rate reducing membrane for the release of an active ingredient.

2. A coating for an implantable device produced in accordance with the method of Claim 1.

3. The method of Claim 1, wherein the particles are made from an inorganic material.

4. The method of Claim 1, wherein the particles are made from a material selected from a group of metals, metal oxides, carbonaceous compounds, main group oxides, nitrides, carbides, and calcium salts.

5. The method of Claim 1, wherein the particles are made from a material selected from a group of rutile titanium oxide, anatase titanium dioxide, niobium oxide, tantalum oxide, zirconium oxide, iridium oxide, tungsten oxide, silica, alumina, gold, hafnium, platinum, iridium, palladium, tungsten, tantalum, niobium, zirconium, titanium, aluminum, chromium, lamp black, furnace black, carbon black, fumed carbon black, gas black, channel black, activated charcoal, diamond, titanium nitride, chromoim nitride, zirconium nitride, tungsten carbide, silicon carbide, titanium carbide, hydroxyapatite, dahlite, brushite, tricalcium phosphate,

calcium sulphate, calcium carbonate, silicides, barium titanate, and strontium titanate.

6. The method of Claim 1, wherein the particles are made from a polymeric material selected from a group of polyolefins, polyurethanes, cellulosics, polyesters, polyamides, poly(hexamethylene isophthalamide/terephthalamide), poly(ethylene terephthalate-co-p-oxybenzoate), poly(hydroxy amide ethers), polyacrylates, polyacrylonitrile, acrylonitrile/styrene copolymer, rubber-modified acrylonitrile/acrylate copolymer, poly(methyl methacrylate), liquid crystal polymers, poly(phenylene sulfide), polystyrenes, polycarbonates, poly(vinyl alcohols), poly(ethylene-vinyl alcohol), epoxies composed of bisphenol A based diepoxides with amine cure, aliphatic polyketones, polysulfones, poly(ester-sulfone), poly(urethane-sulfone), poly(carbonate-sulfone), poly(3-hydroxyoxetane), poly(amino ethers), gelatin, amylose, parylene-C, parylene-D, parylene-N, and mixture thereof.

7. The method of Claim 1, wherein the implantable device is a balloon expandable stent, a self-expandable stent, or a graft.

8. The method of Claim 1, wherein the implantable device is a stent having cavities containing the active ingredient for the release of the active ingredient when the stent is implanted in a passageway.

9. The method of Claim 1, wherein the active ingredient is selected from a group of actinomycin D, docetaxel and paclitaxel.

10. The method of Claim 1, additionally comprising, prior to the act of applying the first composition:

applying a second composition containing the active ingredient to a surface of the implantable device to form a reservoir coating on at least a portion of the surface of the implantable device.

11. The method of Claim 10, wherein the reservoir coating is made from an ethylene vinyl alcohol copolymer.

12. The method of Claim 1, additionally comprising, prior to the act of applying a first composition:

(a) applying a second composition to a surface of the implantable device to form a tie layer on at least a portion of the surface of the implantable device; and

(b) applying a third composition containing the active ingredient to the implantable device to form a reservoir coating on at least a portion of the tie layer,

wherein the tie layer acts as an intermediary adhesive layer between the surface of the implantable device and the reservoir coating.

13. A stent, comprising a first coating containing particles, wherein the first coating acts as a diffusion barrier for an active ingredient.

14. The stent of Claim 13, wherein the stent comprises cavities containing the active ingredient for releasing the active ingredient when the stent is implanted in a passageway.

15. The stent of Claim 13, additionally comprising a second coating formed between the surface of the stent and the first coating, the second coating carrying the active ingredient for the release of the active ingredient when the stent is implanted in a passageway.

16. The stent of Claim 13, additionally comprising:

(a) a second coating formed on at lease a portion of a surface of the stent; and

(b) a third coating formed on at lease a portion of the second coating, the third coating carrying the active ingredient for the release of the active ingredient when the stent is implanted in a passageway,

wherein the second coating provides an adhesive tie between the surface of the stent and the third coating.

17. The stent of Claim 13, wherein the active ingredient is actinomycin D or analogs or derivatives thereof.

18. The stent of Claim 13, wherein the size of the particles is not greater than about 10% of the thickness of the first coating.

19. The stent of Claim 13, wherein the first coating is made from an ethylene vinyl alcohol copolymer.

20. The stent of Claim 13, wherein the particles are made from an inorganic material.

21. The stent of Claim 13, wherein the particles are made from a material selected from a group of metals, metal oxides, carbonaceous compounds, main group oxides, nitrides, carbides, and calcium salts.

22. The stent of Claim 13, wherein the particles are made from a material selected from a group of rutile titanium oxide, anatase titanium dioxide, niobium oxide, tantalum oxide, zirconium oxide, iridium oxide, tungsten oxide, silica, alumina, gold, hafnium, platinum, iridium, palladium, tungsten, tantalum, niobium, zirconium, titanium, aluminum, chromium, lampblack, furnace black, carbon

black, fumed carbon black, gas black, channel black, activated charcoal, diamond, titanium nitride, chromium nitride, zirconium nitride, tungsten carbide, silicon carbide, titanium carbide, hydroxyapatite, dahlite, brushite, tricalcium phosphate, calcium sulphate, calcium carbonate, silicides, barium titanate, and strontium titanate.

23. The stent of Claim 13, wherein the particles are made from a polymeric material selected from a group of polyolefins, polyurethanes, cellulosics, polyesters, polyamides, poly(hexamethylene isophthalamide/terephthalamide), poly(ethylene terephthalate-co-p-oxybenzoate), poly(hydroxy amide ethers), polyacrylates, polyacrylonitrile, acrylonitrile/styrene copolymer, rubber-modified acrylonitrile/acrylate copolymer, poly(methyl methacrylate), liquid crystal polymers, poly(phenylene sulfide), polystyrenes, polycarbonates, poly(vinyl alcohols), poly(ethylene-vinyl alcohol), epoxies composed of bisphenol A based diepoxides with amine cure, aliphatic polyketones, polysulfones, poly(ester-sulfone), poly(urethane-sulfone), poly(carbonate-sulfone), poly(3-hydroxyoxetane), poly(amino ethers), gelatin, amylose, parylene-C, parylene-D, parylene-N, and mixtures thereof.

24. The stent of Claim 23, wherein the polyolefins are selected from a group of polyethylenes, poly (vinyl chloride), poly (vinylidene chloride), poly (vinyl fluoride), poly (vinylidene fluoride), poly (tetrafluoroethylene), poly (chlorotrifluoroethylene), and mixtures thereof.

25. The stent of Claim 23, wherein the polyurethane has a glass transition temperature above a storage temperature.

26. The stent of Claim 23, wherein the polyurethane has a non-polar soft segment, the non-polar soft segment is selected from the group of hydrocarbons, silicones, fluorosilicones, and mixtures thereof.

27. The stent of Claim 23, wherein the cellulosics are selected from the group of cellulose acetate having a DS greater than about 0.8, ethyl cellulose, cellulose nitrate, cellulose acetate butyrate, methyl cellulose, and mixtures thereof.

28. The stent of claim 23, wherein the polyesters are selected from a group of poly (ethylene terephthalate), poly(ethylene 2,6-naphthalene dicarboxylate), poly (butylene terephthalate), and mixtures thereof.

29. The stent of Claim 23, wherein the polyamides are selected from a group of nylon-6, nylon-6,6, nylon-6,9, nylon-6,10, aromatic nylon, and mixtures thereof.

30. A coating for a prosthesis for reducing the rate at which an agent travels through the coating comprising inorganic particles disposed in the coating.

31. The coating of Claim 30, wherein the coating is made from a polymeric material.

32. The coating of Claim 30, wherein the prosthesis is a stent.